WASHINGTON COLLEGE OF LAW
1896

MASTER OF SCIENCE IN TECHNOLOGY OF MANAGEMENT

COLLEGE OF CONTINUING EDUCATION
CENTER FOR TECHNOLOGY AND ADMINISTRATION
The American University Washington, D.C.

THE COLLEGE OF CONTINUING EDUCATION

through its

CENTER FOR TECHNOLOGY AND ADMINISTRATION

offers the Master of Science in TECHNOLOGY OF MANAGEMENT

The Master of Science in Technology of Management is a professional degree designed to equip qualified candidates with a concentrated background in two of the five fields of Computer Systems, Management Information Systems, Operations Research, Scientific and Technical Information Systems, and Research and Development Management. Areas for concentrated effort may be selected from a wide spectrum of subject matter to satisfy the student's requirements.

The discipline, Technology of Management, exists apart from business management, government and public administration, and the classical fields of mathematics and science. It evolved from the acceptance of the electronic digital computer with its associated communications capabilities, as well as from the emergence of a broad and substantial quantitative theory of the properties, structure and flow of information. It approaches problems in all fields involving information transfer, transformation and storage. The discipline should be included in the education of those who will be involved in the management, or design, or development of large, complex systems involving people, resources, and objectives. It includes but is not limited to the use of computers in systems analysis, systems dynamics, statistics, computer assisted instruction, command and control systems, data systems, information storage and retrieval, simulation and modeling and quantitative policy development.

ADMISSION

Candidates applying for admission to the Master of Science in Technology of Management program must have a bachelor's degree from an accredited college or university. He must satisfy certain grade point averages as outlined in the University Bulletin. Forms for application to the graduate program and the required letters of recommendation may be obtained from the Office of Graduate Admissions.

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Provisional admission may be granted to those students who do not meet the minimum standards for admission. This may be accomplished by demonstrated academic performance in the completion of one of the five Graduate Certificate Programs offered by the College of Continuing Education in conjunction with the Center for Technology and Administration.

PROGRAM

In addition to the prerequisites and foundation courses or their equivalents, the program consists of the completion of at least thirty-three graduate credit hours of course work distributed over two fields of concentration. These would be selected to prepare the student for the required two comprehensive examinations. At least twelve hours must be taken in one of the fields including the seminar in that field. The other field requirement may be satisfied by nine hours of graduate work. Twelve hours in each of both fields, including both seminars, is recommended.

Each student will be assigned a faculty advisor who will outline and approve the student's program. Courses and their sequence will be planned. If the thesis option is chosen, the faculty advisor may be the thesis director. The program must be completed with at least a "B" average for all the graduate courses taken.

COMPREHENSIVE EXAMINATIONS

Comprehensive examinations will be offered each semester for each of the fields. Degree candidates may take one or both of the examinations at any one semester offering. To complete the requirements for the degree, each student must pass two comprehensive examinations. They may be selected from:

55.063	Computer Systems
55.064	Operations Research
55.065	Scientific & Technical Information Systems
55.066	Management Information Systems
55.067	Research & Development Management

SPECIAL PROGRAMS

To satisfy the needs of students with special interests, special programs which would include one

his advisor. The second comprehensive field may be a related one offered by one of the other schools or colleges of The American University. It could be a special one, designed by the CTA advisor in consultation with the student to meet the special needs of the student. It would be based on related graduate level courses offered by the University. For instance the Research and Development Management Comprehensive Field may be taken in association with that of the SGPA's Science Technology and Government Program. All special programs are subject to the approval of the Director, CTA and the Dean of the College of Continuing Education.

THESIS

A thesis option is offered. This option satisfies either three or six credit hours depending on the extent of the research involved. This determination will be made between the student and his faculty advisor on the basis of the thesis proposal. It would be subject to the Director's and the Dean's approval.

FIELDS

The candidate for the Master of Science in Technology of Management will select two fields from the five listed below. He will sit for two comprehensive examinations in the two fields selected.

55.063 COMPUTER SYSTEMS

FOUNDATION REQUIREMENTS

55.310	Introduction to Data Processing
✓ 55.333	Computer Programming: FORTRAN, or 55.334 Computer Programming: COBOL
55.411	Introduction to Management Math
✓ 69.400	Managerial Statistics
10.456	The Process of Management

GENERAL REQUIREMENTS

✓ 55.511	The Systems Approach
✓ 55.530	Automatic Data Processing Systems

FIELD REQUIREMENTS

55.531	Computer Design
✓ 55.632	Advanced Computer Applications
55.633	Programming Systems and Language (formerly Evaluation of Software)
55.635	Workshop in Computer Systems
55.637	Workshop in Operating Systems
✓ 55.730	Seminar in Computer Systems

55.064 OPERATIONS RESEARCH

FOUNDATION REQUIREMENTS

69.300	Business Statistics, or 69.400 Managerial Statistics
41.111	Fundamentals of Mathematics II, or 55.411 Introduction to Management Math
10.456	The Process of Management

GENERAL REQUIREMENTS

55.511	The Systems Approach
55.542	Probability and Statistics for Management Decisions

FIELD REQUIREMENTS

55.544	Advanced Management Mathematics
55.641	Methods of Operations Research I
55.642	Methods of Operations Research II
55.645	Workshops in Operations Research
55.666	Cost Benefit Analysis
55.740	Seminar in Operations Research
41.576	Mathematical Methods of OR

55.065 SCIENTIFIC & TECHNICAL INFORMATION SYSTEMS

FOUNDATION REQUIREMENTS

55.310	Introduction to Data Processing
55.333	Computer Programming: FORTRAN
55.411	Introduction to Management Math

GENERAL REQUIREMENTS

55.511	The Systems Approach
55.530	Automatic Data Processing Systems

FIELD REQUIREMENTS

55.550	Survey of Information Science & Technology
55.650	Natural Language Data Processing
55.651	Technical Information Machine Systems
55.653	Concepts of Indexing and Abstracting
55.654	Workshop in Technical Information Handling
55.655	Automated Library Systems
55.656	Publication Techniques
55.750	Seminar in Scientific & Technical Information Systems

55.066 MANAGEMENT INFORMATION SYSTEMS

FOUNDATION REQUIREMENTS

55.310	Introduction to Data Processing
55.333	Computer Programming: FORTRAN, or 55.334 Computer Programming: COBOL
55.411	Introduction to Management Math
69.400	Managerial Statistics
10.456	The Process of Management

GENERAL REQUIREMENTS

55.511	The Systems Approach
55.530	Automatic Data Processing Systems

FIELD REQUIREMENTS

55.560	Systems Design for Business Operations
55.561	Management of ADP Systems
55.660	Management Information & Reporting Systems
55.760	Seminar in Management Information Systems

55.067 RESEARCH & DEVELOPMENT MANAGEMENT

FOUNDATION REQUIREMENTS

69.400	Managerial Statistics
54.310	Public Administration, or 10.481 Principles of Production
10.456	The Process of Management

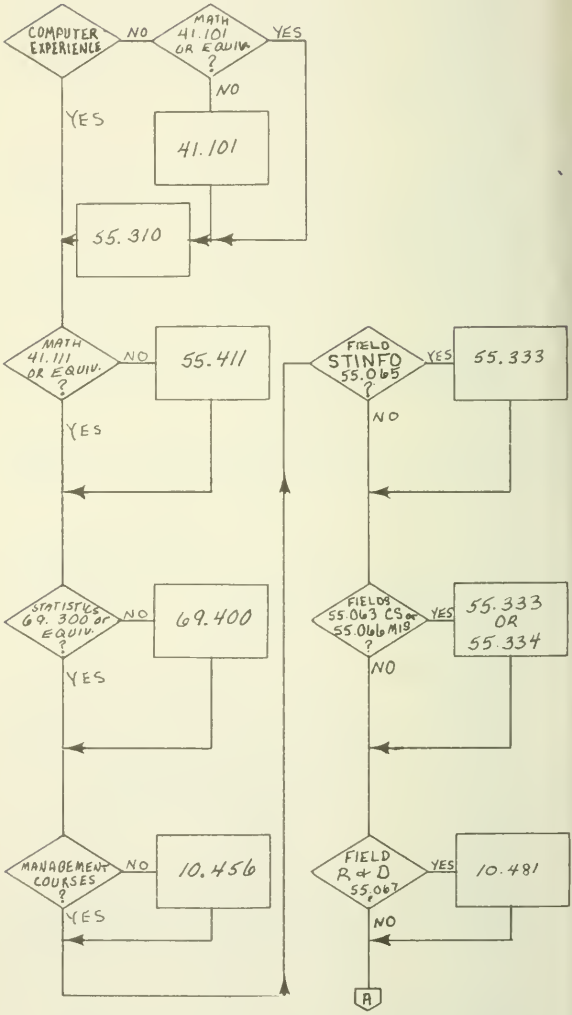
GENERAL REQUIREMENTS

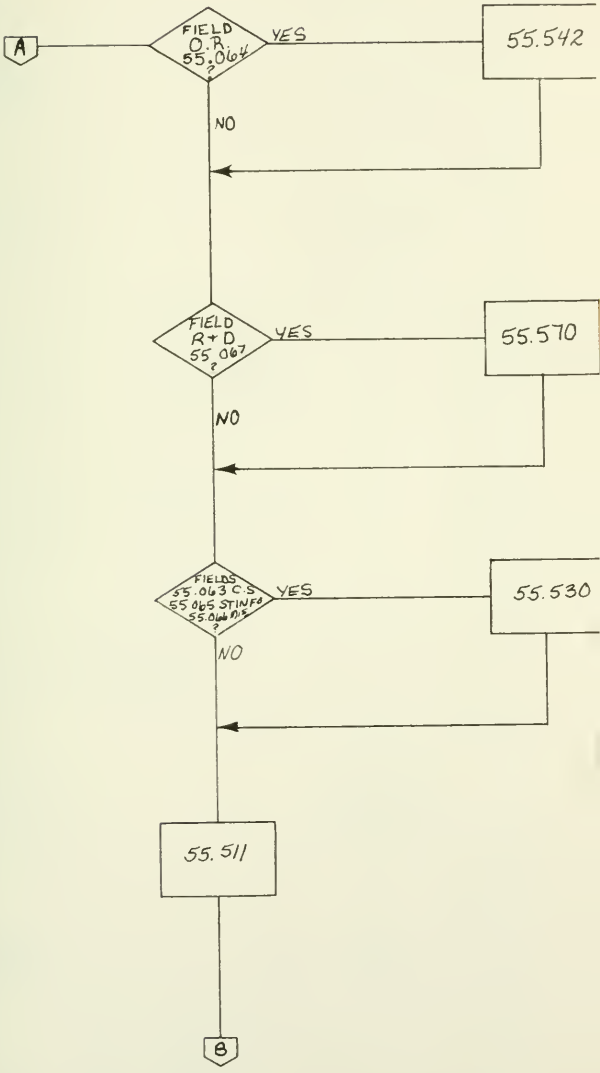
55.511	The Systems Approach
55.570	The Management of Research & Engineering Organizations & Laboratories

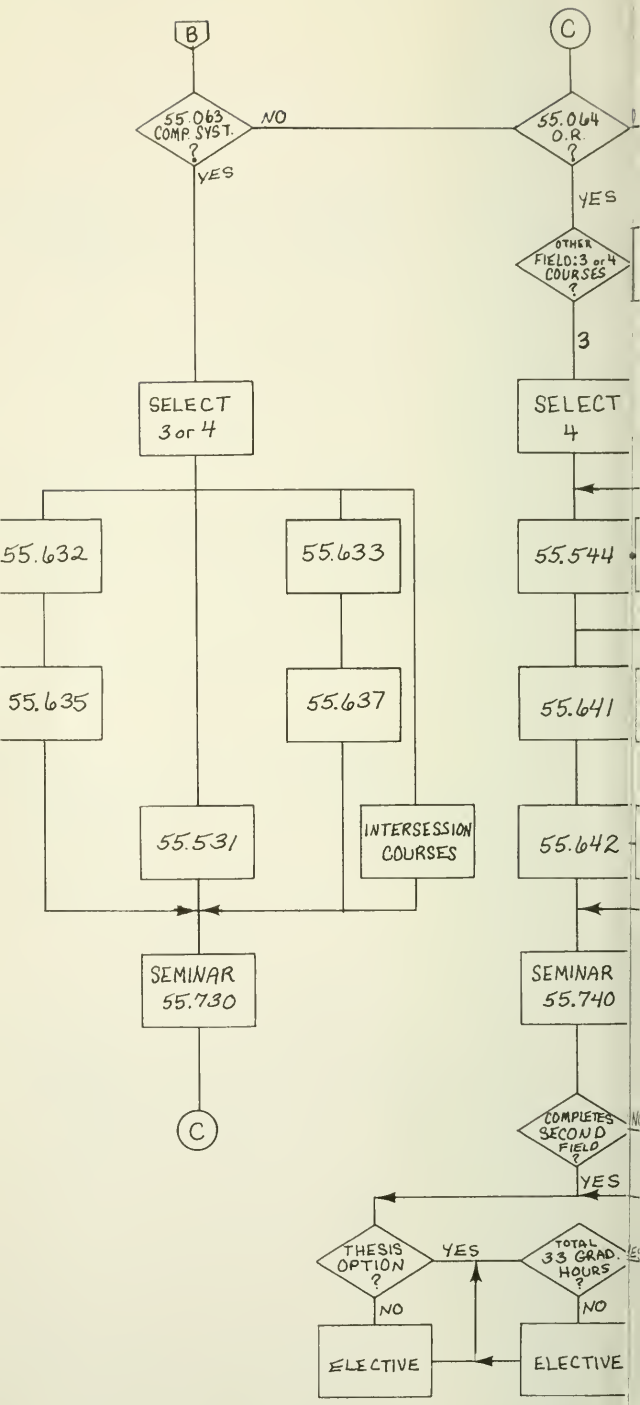
FIELD REQUIREMENTS

55.670	The Politics & Economics of R&D
55.671	R&D in the Total Organization
55.672	Scientific & Engineering Manpower
55.673	Planning & Control of R&D Operations
55.770	Seminar in R&D Management

FOUNDATION REQUIREMENTS




A
FIELD O.R. 55.064 ?
YES
55.542
NO
FIELD R+D 55.067 ?
YES
55.570
NO
FIELDS 55.063 C.S. 55.065 STINFO 55.066 D.S. ?
YES
55.530
NO
55.511
B


B
55.063 COMP. SYST. ?
NO
YES
SELECT 3 or 4
55.632
55.635
55.633
55.637
55.531
INTERSESSION COURSES
SEMINAR 55.730
C
C
55.064 O.R. ?
YES
OTHER FIELD: 3 or 4 COURSES ?
3
SELECT 4
55.544
55.641
55.642
SEMINAR 55.740
COMPLETES SECOND FIELD ?
YES
THESIS OPTION ?
YES
NO
TOTAL 33 GRAD. HOURS ?
NO
ELECTIVE
ELECTIVE

SE
3

4

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5

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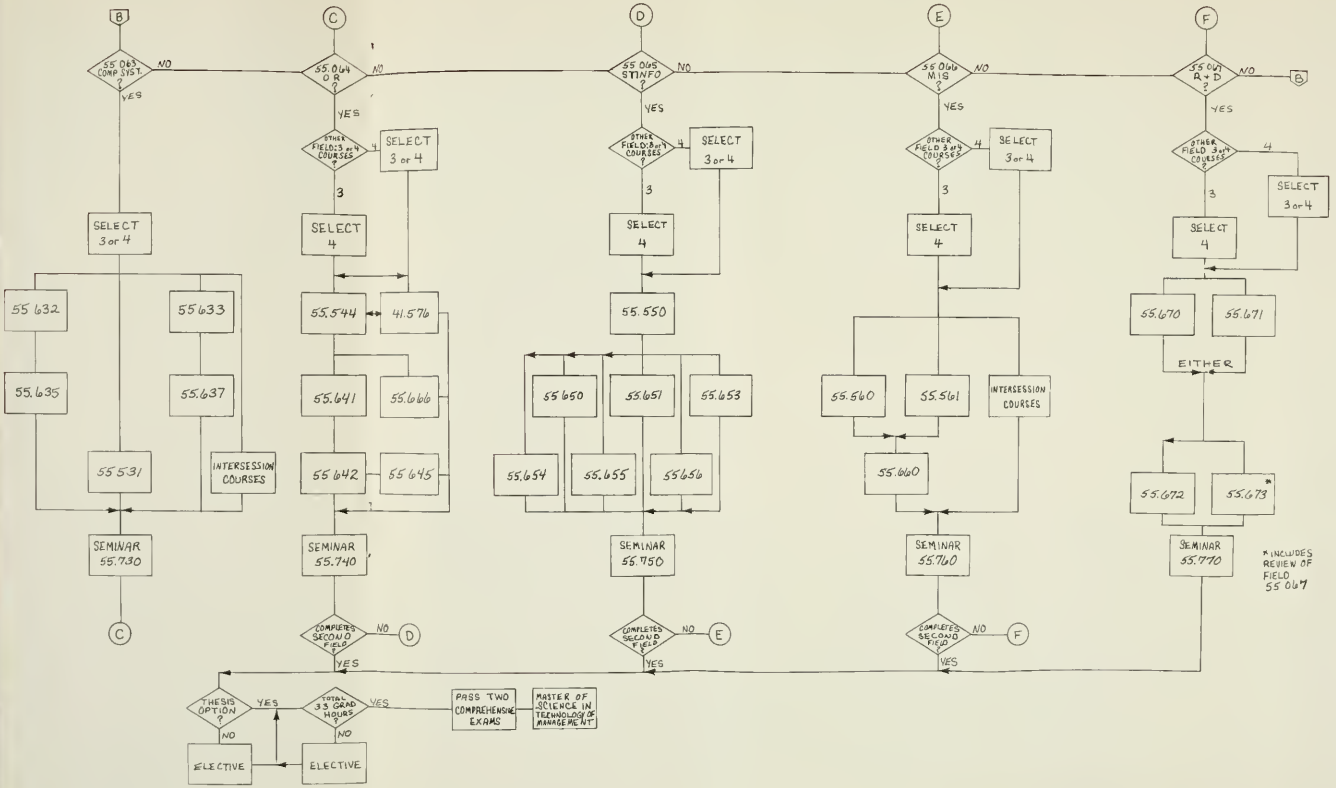
FIELD REQUIREMENTS



NOTE: THESE FLOW DIAGRAMS ARE NOT ALL TECHNICALLY CORRECT IN THAT THERE ARE MULTIPLE PATHS THROUGH MANY OF THE FIELDS. PREREQUISITES ARE USUALLY INDICATED BY CONSTRAINED PATHS. CONSULT A CTA COUNSELOR BEFORE DETAILED PLANS ARE COMPLETED FOR YOUR PROGRAM. COURSE DESCRIPTIONS WILL AID IN PLANNING A PROGRAM.

tion and field work. Related programming techniques. *Prerequisites:* one programming language, and 55.530, or permission.

55.633 Programming Systems and Language (3)
(formerly Evaluation of Software)
Examination of basic attributes of major classes of programming languages and systems. Characteristics that describe basic differences between types of languages emphasized. Roles of various operating systems briefly examined; as well as problems of operating systems design, and implementation. *Prerequisites:* 55.333 or 55.334 and 55.530.

55.635 Workshop in Computer Systems (3)
Advanced computer applications with emphasis on special projects. *Prerequisites:* 55.632 and permission.

✓55.637 Workshop in Operating Systems (3)
Operating system concepts necessary for the management of automatic data processing installation. Include job scheduling, program management, and data files. Utilities, compilers, special purpose languages, telecommunications, and software sources are also discussed. *Prerequisite:* 55.633.

✓55.730 Seminar in Computer Systems (3)
Prerequisite: permission.

OPERATIONS RESEARCH

55.540 Operations Research in Management (3)
Review of general field of Operations Research and its role in the decision making process. Comprehensive overview of the field. Modeling techniques and applications of a variety of prototype problems are covered, including linear programming, inventory and queuing models, replacement and maintenance models. Markov chains, simulation and dynamic programming models. Mathematics employed limited to elementary Algebra and Statistics, stresses the quantitative approach. Not to be taken if OR is a comprehensive field. *Prerequisite:* 69.300 or 69.400.

55.542 Probability and Statistics for Management Decisions (3)
Decision under uncertainty; cost of uncertainty; probability distributions; conditional models; Bayesian approach; sequential decision procedures; hypothesis testing; estimation. *Prerequisites:* 69.300 or 69.400; 41.111 or 55.411.

55.544 Advanced Management Mathematics (3)
Review of mathematics necessary for advanced work in Operations Research. Sets and relations; mathematical induction; series; limits and continuity; differentiation; optimization; integration; differential equations; probability theory. *Prerequisite:* 41.111. Not required where 41.222 and 41.223 (or equivalent) have been satisfactorily completed *recently.* This course will be required, as a prerequisite for 55.641, of students whose differential and integral calculus were taken more than ten years ago.

55.641 Methods of Operations Research I (3)
Review of statistical basis for sampling; inventory, replacement and sequencing problems; mathematical programming including linear, non-linear and integer programs; competitive strategies and their methods of solution. *Prerequisites:* 55.542 and 55.544 or equivalent (as stated under 55.544).

55.642 Methods of Operations Research II (3)
Role of selected probability distributions in OR; Queuing Theory and Applications; Markov Processes; Dynamic Programming and extensions integrating Markov Processes; selected problems in simulation. *Prerequisite:* 55.641 or permission.

55.645 Workshops in Operations Research (3)
Depending upon current interests of the student body, special topics will be taken up in depth. They will be selected from such subjects as maintenance, reliability, advanced topics in mathematical programming, and capital investments. Where required, advanced mathematical and statistical techniques will be covered. *Prerequisite:* 55.642.

55.666 Cost-Benefit Analysis (3)
Examination of the techniques used to evaluate nonmarket oriented goods and services. *Prerequisites:* 55.411, 55.544, or 41.223.

55.740 Seminar in Operations Research (3)
Prerequisite: permission.

SCIENTIFIC & TECHNICAL INFORMATION SYSTEMS

55.550 Survey of Information Science and Technology (3)
Introductory survey of scientific and technical communications field with emphasis upon modern mechanized methods. Information theory, documentation, reprography, computer-aided photocomposition among the topics covered. Symbiotic relationship between the publishing field and information storage and retrieval systems stressed as underlying philosophy of the course. A prerequisite for all other courses in the Scientific and Technical Information Systems area. *Prerequisite:* 55.310 or equivalent experience.

55.650 Natural Language Data Processing (3) (formerly Computational Linguistics)
Basic knowledge of computational linguistics, useful in any field in which computer is called upon to interpret or to analyze natural language such as indexing and classifying documents, extracting and abstracting, analyzing stylistic variations, machine translation and automating concordances. Non-specialist oriented introduction to field for information scientists, computer programmers, librarians and others interested in learning the scope of computer applications in alleviating some of the more tedious and repetitive tasks of scholarly research. Students of modern linguistics should be particularly concerned with the implications of this powerful tool in their discipline. *Prerequisite:* 55.550 or equivalent experience.

55.651 Technical Information Machine Systems (3)
Application of machine systems with major emphasis on the handling of the scientific and technical literature. Capabilities of mechanized systems emphasized, with adequate consideration given to software developments. File organization and record formatting stressed. User requirements and evaluation techniques form the central core of this course. *Prerequisites:* 55.530, 55.550 or their equivalent in experience.

55.653 Concept of Abstracting and Indexing (3)
The impact of automatic data processing and mechanized methods upon processing and dissemination of information. Emphasizes mainly intellectual functions to which this information must be subjected before and after machine intervention. "Arts" of abstracting and indexing. Analyzes technical writing, annotating, indicative and informative abstracting, classification methods including the Universal Decimal Classification and faceted classification, word indexing both in- and out-of-context, vocabulary control and Thesaurus-building, links and roles, citation indexing and relevance/recall ratios. Students must abstract and index limited number of documents in their own fields of interest and specialization. *Prerequisite:* 55.550 or equivalent experience.

55.654 Workshops in Technical Information Handling (3)
From time-to-time, as warranted by current interest, faculty availability and composition of the student body, special topics will be covered. Examples are chemical notation systems, specialized information needs of various disciplines, and professions (e.g., law, medicine, business administration, etc.), and integrated information networks. Students may repeat this course several times, provided that identical topics are not duplicated. *Prerequisite:* 55.550 or permission of the instructor.

55.655 Automated Library Systems (3)
Introduction to the application of Systems Analysis and computers to the modern library. Library functions are analyzed systematically with a view toward the automation and mechanization of such clerical functions as book and journal acquisitions, preparation of accession lists, charging-out routines, etc. In addition, the use of the computer in the production of catalog cards, book catalogs, bibliographies and indexes is emphasized. Techniques for the evaluation of library effectiveness discussed with the ultimate aim of providing maximum user satisfaction. Particularly directed at practicing librarians who wish to apply modern systems of technology to their own libraries. *Prerequisite:* 55.550 or permission of the instructor.

55.656 Publication Techniques (3)
Careful analysis of the present state-of-the-art of primary journal publication with emphasis on economic factors. Computer-aided photocomposition technology, with emphasis on machines such as the Photon, Video-comp and Linotron. Mechanized processing of primary publications, abstracts and indexes as part of an integrated system in which scientific and technical publications are part-and-parcel of information storage and retrieval systems, i.e. the Medical Literature Analysis and Retrieval System (MEDLARS) of the National Library of Medicine.

55.750 Seminar in Scientific and Technical Information Systems (3)
Prerequisite: permission.

MANAGEMENT INFORMATION SYSTEMS

55.411 Introduction to Management Mathematics (Course)
Mathematical logic, elementary point set theory, finite probability. Markov chains, difference equations, vectors and matrices and matrix games. *Prerequisite:* 41.101. Not required where 41.110 and 41.111 (or equivalents) have been completed satisfactorily.

55.511 The Systems Approach (3)
Introduction to systems analysis approach to study and design of managerial and operational organization and process. Fundamental to all other courses in this general sequence, or for anyone who expects to be responsibly concerned with managerial, operational or control organizations and processes of business or government. Includes problem exercises to illustrate the rigor of the discipline and nature and scope of its applications. *Prerequisites:* 69.202 or 69.400.

55.560 Systems Design for Business Operations (3)
Opportunity to develop and defend specific management sciences techniques against both hypothetical and actual business operations and problem areas. Use of case studies, group discussions and projects, against current business operations, guidance in developing firm understanding of relationships and dependence upon interdisciplinary approaches to problem recognition, definition, development of alternatives and ultimate selection of optimum solution based on cost/effectiveness. *Prerequisite:* 55.530.

55.561 Management of Automatic Data Processing Systems (3)
Examination of unique problems, functions and requirements of data processing management. Within role of this management, planning, installation, operation and organization of computer facility examined. Executive interaction stressed, specifically in decision-making, planning and evaluation functions. The course content is developed through lectures and reports. *Prerequisite:* 55.530.

55.660 Management Information and Reporting Systems (3)
Provides an understanding of the complexity of an integrated information system and its components. Covers system design, development, application, utilization and evaluation. Various philosophies concerning the manner and degree of depth and breadth of the integrated management information system approach reviewed. Advanced management techniques (*e.g.*, real-time systems, time sharing, file management systems, models, simulations, operations research and cybernetics) are discussed in terms of their applicability to Management Information and Reporting Systems. *Prerequisites:* 55.530 and 55.560.

55.760 Seminar in Management Information Systems (3)
Prerequisite: permission.

RESEARCH & DEVELOPMENT MANAGEMENT

55.570 Management of Research and Engineering Organizations and Laboratories (3)

Basic course on management of research and engineering organization. Discussion of the full spectrum of elements in such an organization-utilization of resources, comparison of government and business, establishment of procedures and methodologies for effective and efficient operations. *Prerequisites:* for undergraduates: 10.481. For graduate students: comparable course work or experience.

55.670 The Politics and Economics of Research and Development (3)

Magnitude, characteristics, and politico-economic significance of the R&D economy of the U.S. and comparatively, of other countries. Structure and nature of the U.S. research industry. Government-business defense economy. Governmental non-military research. Business and industrial research. Trends and forecasts. National resources allocation, and other political and economic problems. *Prerequisite:* permission.

55.671 R & D in the Total Organization (3)

Criteria for top management decisions: (a) Capabilities of scientific, technological, and social science research; (b) utilization for needs of the specific organization; (c) definition of R&D requirements, in-house and/or external implementation, determination of budget; (d) evaluation of success and contribution of organizational objectives; (e) conversion of R&D results into governmental or business applications, products, or processes. *Prerequisite:* 55.570.

55.672 Scientific and Engineering Manpower (3)

Study in depth of scientific and engineering manpower stressing role of individual in the R&D environment and his interface with the total resources of which he is a part. Impact of the innovative forces at work. For advanced graduate student. *Prerequisites:* 55.570 and at least one other of above R&D courses.

55.673 Planning and Control of Research and Development Operations (3)

Study in depth of role of today's research and development manager. Review of operational policies and goals. Forecasting, planning, and programming techniques, analysis methodology. Exercise of "value judgments". Intended for the advanced graduate student. *Prerequisites:* 55.570 and at least one other of the above R&D courses. NOTE: If 55.770 is not offered in any given semester, 55.673 will be accepted as the SGPA Master's research requirement (in lieu of thesis).

55.770 Seminar in Research and Development Management (3)

For course content, see 55.673. Offered for those students whose program requires a Seminar in lieu of a Thesis for a Masters Degree. *Prerequisites:* 55.570 and at least one other of the above R&D courses, and permission.

THE FACULTY

Center for Technology and Administration

PAUL W. HOWERTON, Director; Ph.B., Northwestern University

RICHARD A. BASSLER, Director, Computer Systems Program; Assistant Professor of Information Science; B.S., University of Colorado; M.S., The George Washington University

RALPH I. COLE, Director, Graduate R&D Program; Associate Professor of R&D Management; B.S., Washington University; M.S., Rutgers University

HAROLD E. FASSBERG, Interim Director for Operations Research Program; Adjunct Professor; B.A., Ohio State University; M.A., University of Pittsburgh; Ph.D., The American University

WILLIAM HOWARD GAMMON, Assistant Professor of Information Science; B.A., The George Washington University; M.A., The American University

WALTER J. KENNEVAN, Director, Management Information Systems Program; Assistant Professor of Information Science; B.C.S., M.C.S., M.F.A., Catholic University

JANET M. MALCOLM, Assistant Professor of Information Science; B.S., Douglass College; M.S., Northwestern University; Ph.D., Columbia University

RICHARD POWERS, Professor of Operations Research; B.S., M.A., Ph.D., University of Virginia

JAMES K. ROCKS, Assistant Professor of Information Science; B.A., Columbia University; M.A., Boston University

MARVIN I. ROSENBERG, Assistant Professor of Computer Systems; B.S., U.S. Naval Academy; M.S., Purdue University

DAVID C. WEEKS, Adjunct Professor of Information Science; B.A. (hon), McGill University; M.A., Ph.D., University of London

ISAAC D. WELT, Director, Scientific and Technical Information Systems Program; Professor of Information Science; B.S., M.S., McGill University; Ph.D., Yale University

THE COLLEGE OF CONTINUING EDUCATION

The mission of the College of Continuing Education is to serve the educational needs of adults who seek professional or personal advancement through full- or part-time study.

Some adults enroll in the College of Continuing Education to complete a degree. Many students take courses to meet professional requirements of their career field, while others take courses for personal enrichment.

The College of Continuing Education offers a wide range of academic programs geared to meet highly diversified student needs. These programs include degrees and certificates both on an undergraduate and graduate level, in-service training, and research programs. The certificate programs are offered for specialized preparation in a particular career field. Under certain conditions certificate work may be applied towards the award of a degree.

The College of Continuing Education is located in the McKinley Building on The American University campus. The college maintains a full-time staff of academic advisors to serve its students. For further information call 686-2500.

For further information write to:

Director
Center for Technology and Administration
The American University
Massachusetts and Nebraska Aves., N.W.
Washington, D.C. 20016

Telephone: 686-2513